

# United States Patent and Trademark Office

UNITED STATES DEPARTMENT OF COMMERCE United States Patent and Trademark Office Address: COMMISSIONER FOR PATENTS P.O. Box 1450 Alexandria, Virginia 22313-1450 www.uspto.gov

DATE MAILED: 12/21/2005

APPLICATION NO.	F	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.	
10/611,992		07/03/2003	Jae-Hyun Ryou	H0004618-US	3405	
22913	7590	12/21/2005		EXAMINER		
WORKMA			RODRIGUEZ, ARMANDO			
(F/K/A WOR	KMAN	NYDEGGER & S	EELEY)			
60 EAST SOUTH TEMPLE				ART UNIT	PAPER NUMBER	
1000 EAGLE	E GATE	TOWER	2828			
SALTIAKE	CITY	UT 84111				

Please find below and/or attached an Office communication concerning this application or proceeding.

, , , , , , , , , , , , , , , , , , , ,	Application No.	Applicant(s)	
	10/611,992	RYOU, JAE-HYUN	
Office Action Summary	Examiner	Art Unit	-
	ARMANDO RODRIGUEZ	2828	
The MAILING DATE of this communication	appears on the cover sheet with	the correspondence address	
Period for Reply			
A SHORTENED STATUTORY PERIOD FOR REWHICHEVER IS LONGER, FROM THE MAILING  - Extensions of time may be available under the provisions of 37 CF after SIX (6) MONTHS from the mailing date of this communication  - If NO period for reply is specified above, the maximum statutory period for reply within the set or extended period for reply will, by some Any reply received by the Office later than three months after the meaned patent term adjustment. See 37 CFR 1.704(b).	G DATE OF THIS COMMUNICA R 1.136(a). In no event, however, may a reply n. eriod will apply and will expire SIX (6) MONTHS tatute, cause the application to become ABANI	TION. be timely filed  from the mailing date of this communication.  DONED (35 U.S.C. § 133).	
Status			
1) Responsive to communication(s) filed on _			
	This action is non-final.		
3) Since this application is in condition for allo	owance except for formal matters	s, prosecution as to the merits is	
closed in accordance with the practice und	ler <i>Ex parte Quayl</i> e, 1935 C.D. 1	1, 453 O.G. 213.	
Disposition of Claims			
4)⊠ Claim(s) <u>1-17</u> is/are pending in the applica	tion.		
4a) Of the above claim(s) is/are with			
5) Claim(s) is/are allowed.			
6)⊠ Claim(s) <u>1-17</u> is/are rejected.			
7) Claim(s) is/are objected to.			
8) Claim(s) are subject to restriction ar	nd/or election requirement.		
Application Papers			
9) The specification is objected to by the Exar	niner.		
10) The drawing(s) filed on is/are: a)		the Examiner.	
Applicant may not request that any objection to			ļ
Replacement drawing sheet(s) including the co			
11) The oath or declaration is objected to by the	e Examiner. Note the attached O	ffice Action or form PTO-152.	
Priority under 35 U.S.C. § 119			
12) Acknowledgment is made of a claim for fore	eign priority under 35 U.S.C. & 1:	19(a)-(d) or (f)	
a) ☐ All b) ☐ Some * c) ☐ None of:	eigh phoney under do d.o.o. 3 1	13(4) (4) 51 (1).	
1. Certified copies of the priority docum	nents have been received.		
2. Certified copies of the priority docum		lication No.	
3. Copies of the certified copies of the			
application from the International Bu	· · · · · ·		
* See the attached detailed Office action for a		ceived.	
	•		
Attachment(s)			
1) Notice of References Cited (PTO-892)	4) 🔲 Interview Sum	mary (PTO-413)	
2) Notice of Draftsperson's Patent Drawing Review (PTO-948	) Paper No(s)/N	fail Date	
<ol> <li>Information Disclosure Statement(s) (PTO-1449 or PTO/SE Paper No(s)/Mail Date 2-19-2004.</li> </ol>	3/08) 5) ☐ Notice of Infor 6) ☐ Other:	mal Patent Application (PTO-152)	

U.S. Patent and Trademark Office PTOL-326 (Rev. 7-05)

Art Unit: 2828

#### **DETAILED ACTION**

### Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1, 6, 10 and 11 are rejected under 35 U.S.C. 102(e) as being anticipated by Chang et al (US 6,765,238).

Regarding claims 1, 10 and 11,

Figure 7 illustrates vertical cavity surface emitting laser (VCSEL) having a substrate (420) [applicant's substrate], a DBR (430) [applicant's first mirror], an active region (412) [applicant's active region], tunnel junction (302) [applicant's tunnel junction] and a DBR (432) [applicant's second mirror]. Column 12 line 11-12 discloses an InP substrate. Column 13 lines 18-21, discloses a p-type tunnel junction layer (306) composed of InGaAs and column 17 lines 40-42, discloses either n-type or p-type tunnel junction layers as being pseudomorphically.

Regarding claim 6,

Column 9 lines 4-5, discloses the tunnel junction grown by MOCVD.

Regarding claims 7 and 13,

Art Unit: 2828

Column 8 lines 6-16, discloses the p-type tunnel junction doped with carbon and discloses a hole concentration of 1.3X10<sup>20</sup> cm<sup>-3</sup>.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 11-14, 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Sekiguchi et al (Jpn. J. Appl. Phys.).

Regarding claim 11,

Page 443 second column second paragraph describes a tunnel junction having a p-type layer composed of AlAs.

Regarding claim 12,

Page 443 second column second paragraph discloses tunnel junction structure having a Zn-doped InGaAsP.

Regarding claim 13,

Page 443 second column second paragraph discloses the p-type AlAs layer having a concentration of 1X10<sup>19</sup> cm<sup>-3</sup>.

Regarding claim 14,

Page 443 second column second paragraph describes a tunnel junction structure having an n-type InP layer.

Regarding claim 16,

Page 443 second column second paragraph describes a tunnel junction structure having an n-type InP layer with a thickness of 100 angstrom [applicant's 10 nanometer].

Art Unit: 2828

## Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 2, 9, 15 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 6,765,238) as applied to claims 1 and further in view of Sekiguchi et al (Jpn. J. Appl. Phys.).

Regarding claim 2,

Chang et al does disclose a vertical cavity surface emitting laser (VCSEL) with a tunnel junction but is silent as to the tunnel junction including Zn doped layer.

Sekiguchi et al discloses in page 443 second column second paragraph a tunnel junction structure having a Zn-doped InGaAsP.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the tunnel junction structure of Sekiguchi et al with the VCSEL of Chang et al because it will provide a long wavelength laser.

Regarding claim 9,

Chang et al does disclose a vertical cavity surface emitting laser (VCSEL) with a tunnel junction but is silent as to the tunnel junction including an n-doped layer consisting of InP, ALInAS, AlInGaAsP ro InGaAsP.

Art Unit: 2828

Sekiguchi et al discloses in page 443 second column second paragraph a tunnel junction structure having an n-type InP layer.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the tunnel junction structure of Sekiguchi et al with the VCSEL of Chang et al because it will provide a long wavelength laser.

Regarding claims 15 and 17,

Cahng et al discloses in page 443 second column second paragraph describes a tunnel junction structure having an n-type InP layer with a thickness of 100 angstrom [applicant's 10 nanometer].

Sekiguchi et al discloses in page 443 second column second paragraph an ntype InP tunnel junction layer having a concentration of 1X10<sup>19</sup> cm<sup>-3</sup>.

Chang et al and Sekiguchi et al are silent as to the concentration of n-type InP layer being greater than 5X10<sup>19</sup> cm<sup>-3</sup>.

However, in accordance with MPEP 2144.05

A prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. Titanium Metals Corp. of America v. Banner, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.).

Art Unit: 2828

In the instant application the concentration of the n-type InP tunnel junction of Sekiguchi et al is within the same exponential range as the recited concentration thereby both concentrations would provide the same effects within the tunnel junction structure, which is to obtain a long wavelength VCSEL as described by Sekiguchi et al in the abstract and as described by applicant in page 2 lines 4-6 of the specification.

Claims 3, 4, 5 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (US 6,765,238) as applied to claims 1 and further in view of Bour et al (US 2004/0161013).

Regarding claims 3, 4 and 5,

Chang et al discloses a vertical cavity surface emitting laser (VCSEL) with a tunnel junction and n-type DBR, column 13 lines 5-9.

Chang et al is silent as to the VCSEL having spacer layers.

Bour et al illustrates in figure 1 a VCSEL having a tunnel junction (17), DBR (12) and (14) and spacers (17) and (18).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to combine the spacer of Bour et al with the VCSEL of Chang et al because it will provide a correct resonant wavelength for the cavity, paragraph [0009] of Bour et al.

Regarding claim 8,

Chang et al does disclose the use of InP substrate but is silent as to the composition of the active region.

Art Unit: 2828

However, it is well known in the art to use an active layer from the InP when the substrate is Indium based, as disclosed by Bour et al in paragraph [0010], where the active region may be selected from material as InP, AlGaInP, InGaAsP and AlGaInAs.

#### Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ARMANDO RODRIGUEZ whose telephone number is 571-272-1952. The examiner can normally be reached on 9:00 AM - 5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, MINSUN HARVEY can be reached on 571-272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

ARMÁNDO RODŘIGUEZ

Examiner
Art Unit 2828